

REMARKS

Claims 1-21 are present in this application. Claims 1 and 12 are independent.

Interview

The Examiner is thanked for conducting the interview. It is believed that, as a result of the interview, Applicants and the Examiner each have a better understanding of each others' position.

Claim Rejection - 35 USC 102

Claim 12 has been rejected under 35 U.S.C. 102(e) as being anticipated by Bao et al. (U.S. Patent 6,266,108, "Bao"). Applicant respectfully traverses this rejection.

The present invention provides improved display quality over conventional display devices. It was found that conventional display devices suffer from poor display quality when an illumination device is employed (present specification at page 6, paragraph beginning on line 7). In particular, Applicants have determined that a "prism phenomenon" can occur due to light interference between an optical guide member having a periodic structure and a regular array of color pixels including a color filter. Because of the prism phenomenon, a viewer is likely to observe moire fringes, i.e., a blurry or clouded display. Applicants have found that the source of the prism phenomenon

appears to be caused by the arrangement of the color pixels to coincide with the periods of the periodic structure on a surface of the optical guide member (present specification at page 21, paragraph beginning on line 12).

The present invention, in a preferred embodiment, improves the display quality of a display device by an arrangement of the periodic structure on the surface of the optical guide member that does not coincide with the array of color pixels. The periodic structure on the surface of the optical guide member is defined by a plurality of propagation portions (e.g., portions 403(a) shown in Figure 4) and a plurality of reflection portions (e.g., portions 403(b) shown in Figure 4) periodically provided on the second principal face (e.g., face 12) of the optical guide member (e.g., member 104).

In order to prevent coincidence, the periodic structure of the present invention is preferably formed at an angle that does not coincide with the direction of the pitch of the color pixels (e.g., first direction 21 of the pitch P1 along which the color pixels are arrayed) and does not coincide with the direction of the pitch of the color composite pixels (e.g., second direction 22 of the pitch P2 of the color composite pixels). (present specification at page 47, paragraph beginning at line 4).

With respect to this relationship, claim 12 recites, "wherein the optical guide member includes a periodic structure formed on the

second principal face, the periodic structure including propagation portions and reflection portions alternating along a third direction at an angle from said light source, and wherein the third direction coincides with neither a first direction parallel to the light source nor a second direction perpendicular to the light source, and is coplanar with the second principal face of the optical guide member."

The Office Action states that the direction of the periodic structure, i.e., the claimed third direction, is taught by Bao's angle of inclination θ (see Bao Fig. 1). Applicants submit that unlike Bao's angle of inclination, the claimed third direction is coplanar with the second principal face (e.g., 12 in present Fig. 1B) of the optical guide member. Thus, at least for this reason, Applicants submit that each and every claimed feature is not taught or suggested by Bao. Accordingly, Applicants respectfully request that the rejection be withdrawn.

Claim Rejection - 35 USC 103

Claims 1-6, 10, and 11 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Bao et al. (U.S. Patent 6,266,108, "Bao") over Yamanashi (U.S. Patent 6,259,499). Applicants respectfully traverse this rejection.

Claim 1

As discussed in the above with respect to claim 12, the present invention improves over conventional display devices. Applicants had found that when an illumination device is employed with certain conventional display devices, a moire fringe occurred leading to a blurry or clouded display. Applicants determined that moire fringes appeared due to a prism phenomenon occurring between the periodic structure of the optical guide member and color pixels, which include a color filter. Applicants determined that interference occurred between periodic patterns leading to generation of moire fringes. For example, as shown in Fig. 16 of the present invention, light from a light source reflected by the periodic structure of the optical guide member forms a first periodic pattern (light 2214), the light reflected from the pixels of the LCD (light 2215) that passes back through the periodic structure forms a second periodic pattern, and the pixel pattern of the LCD forms a third periodic pattern. Overlap of these three periodic patterns may lead to generation of moire fringes.

The present invention, in a preferred embodiment, solves the problem of moire fringe generation in an arrangement between the direction of light originating from a light source and pitch of the pixels. In particular, the light source is disposed at a side of the display region such that light emitted from the light source travels along a longer period, i.e., the pitch of the color

composite pixels (see present specification at page 16, paragraph beginning on line 11).

With respect to claim 1, this arrangement between the light source and color pixels is recited as:

"an illumination section in which light from a light source enters an optical guide member at a first principal face, and a reflection type LCD that includes a plurality of color composite pixels and a color filter layer having a regular array of a plurality of color filters, each of the plurality of color composite pixels including a plurality of color pixels, each of the plurality of color pixels being defined by a corresponding one of the plurality of color filters,

the plurality of color pixels having a pitch P_1 along a side of each color pixel, and the plurality of color composite pixels having a pitch P_2 along a side of each color composite pixel, the pitch P_1 being smaller than the pitch P_2 ,

each of the color pixels being arranged with respect to the light source such that the side having the pitch P_1 is perpendicular to the light entering the first end face of the optical guide member, each of the color composite pixels being arranged with respect to the light source such that the side having the pitch P_2 is parallel to the light entering the first end face of the optical guide member, and the light source being disposed in the vicinity of a side of the display region extending

substantially in parallel to the side of each color pixel having pitch P1."

The Office Action states that Bao teaches a reflective liquid crystal display having a light source 30. The Office Action admits that Bao fails to teach a color filter having the claimed arrangement of color pixels. Instead, the Office Action relies on Yamanashi for teaching features of a color filter and arrangement of color pixels. Yamanashi shows conventional arrangements of pixels in color filters, but does not disclose a light source. Thus, Yamanashi does not address the problem of generation of moire fringes due to light interference patterns.

Applicants submit that Bao and Yamanashi, either alone or in combination, fail to teach the claimed arrangement of a light source with respect to color pixels and color composite pixels. Unlike Yamanashi, in the present claimed invention, each of the color composite pixels is arranged with respect to the light source such that the side of the color composite pixels having the longer pitch P2 is parallel to the light entering the first end face of the optical guide member. As mentioned above, the claimed arrangement leads to reduction in generation of moire fringes and thus better quality display.

Thus, Applicants submit that the rejection fails to establish *prima facie* obviousness for claim 1. The same arguments as in the above for claim 1 apply as well to dependent claims 2-6, 10 and 11,

as well. Applicants respectfully request that the rejection be withdrawn.

New Claims

Claims 16 through 21 have been added. New claim 16 covers comparable structure to the structure recited in claim 1 and further limits the invention to the embodiment shown in Figure 11 of a regular stripe array. New claim 19 also covers comparable structure to the structure recited in claim 1 and further limits the invention to the embodiment shown in Figure 12 of a regular delta array. Both claim 16 and claim 19 recite the novel benefit of the present invention that light entering the first end face of the optical guide member travels along the longer pitch of the color pixels. New claims 17 and 18 depend from claim 16. New claims 20 and 21 depend from claim 19. Thus, at least for reasons in the above with respect to claim 1, Applicants submit that new claims 16 through 21 also distinguish over Bao and Yamanashi.

CONCLUSION

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert W. Downs (Reg. No. 48,222) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

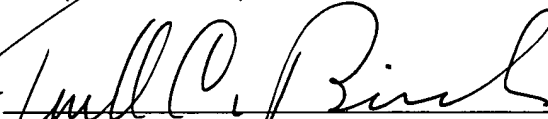
Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant(s) respectfully petition(s) for a two (2) month extension of time for filing a reply in connection with the present application, and the required fee of \$430.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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